3/21/16

"Experience enables you to recognize a mistake when you make it again."-Franklin P. Jones

HW: TBA HW page # 1 , 2

Test 3 on Friday 4/1

AIM: What are Domain and Range?

Warm Up:

Because functions convert values of inputs into value of outputs, it is natural to talk about the sets that represent these inputs and outputs. The **set of inputs** that result in an output is called **the domain** of the function. The **set of outputs** is called **the range**.

***Exercise* #1:** Consider the function that has as its inputs the months of the year and as its outputs the number of days in each month. In this case, the number of days is a function of the month of the year. Assume this function is restricted to non-leap years.

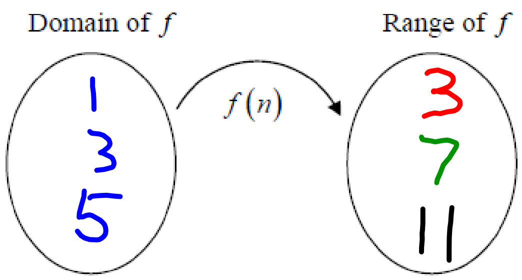
(a) Write, in roster form, the set that represents this function's domain. (inputs)

{ January, Feb, Mar, Apr, May, June, July, Aug, Sept, Oct, Nov, Dec }

(b) Write, in roster form, the set that represents this function's range.

{28, 30, 31}

***Exercise* #2:** State the range of the function $f(n) = 2n + 1$ if its domain is the set $\{1, 3, 5\}$. Show the domain and range in the mapping diagram below.

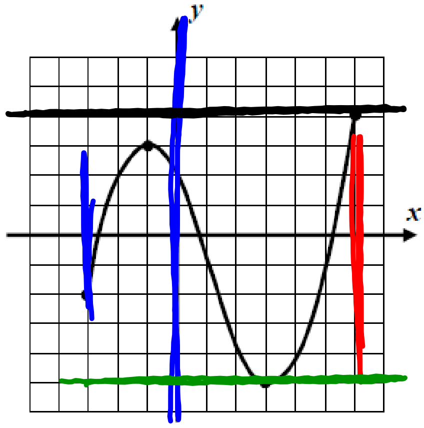


$f(1) = 2(1) + 1 = 3$

$f(3) = 2(3) + 1$

$f(5) = 2(5) + 1$

Exercise **#3:** The function $y = g(x)$ is completely defined by the graph shown below. Answer the following questions based on this graph.



(a) Determine the minimum and maximum x-values represented on this graph.

min $x = -3$ max: $x = 6$

(b) Determine the minimum and maximum y-values represented on this graph.

min $y = -5$ Max $y = 4$

(c) State the domain and range of this function using set builder notation.

Domain: $-3 \leq x \leq 6$

Range: $-5 \leq y \leq 4$

Domain $\longleftrightarrow$ x-values

Range $\updownarrow$ y-values

(Not Included) Ex $(2,3)$ All #s between 2 and 3

[Included] $[2,3]$ All #s between 2 and 3 including 2 and 3

Some functions, defined with graphs or equations, have domains and ranges that stretch out to infinity. Consider the following exercise in which a standard parabola is graphed.

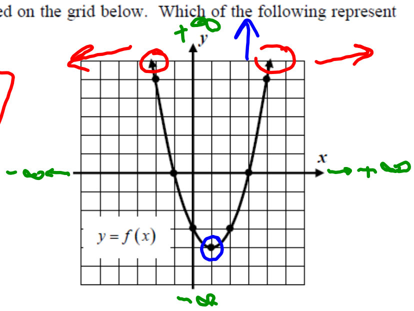
Exercise #4: The function $f(x)=x^2-2x-3$ is graphed on the grid below. Which of the following represent its domain and range written in interval notation?

(1) Domain: $[-2, 4]$
Range: $[-4, 6]$

(3) Domain: $(-\infty, \infty)$
Range: $[-4, \infty)$

(2) Domain: $[-2, 4]$
Range: $(-4, \infty)$

(4) Domain: $(-2, 4)$
Range: $(-4, 6)$



For most functions defined by an algebraic formula, the domain consists of the set of all real numbers, given the concise symbol $\mathbb{R}$. Sometimes, though, there are restrictions placed on the domain of a function by the structure of its formula. Two basic restrictions will be illustrated in the next few exercises.

can be one of each { (not included) [included]

Restriction

Exercise #5: The function $f(x)=\frac{2x+1}{x-4}$ has outputs given by the following calculator table.

Cannot have a 0 in the denominator b/c you can't Divide by 0 (Undefined)

(a) Evaluate $f(1)$ and $f(6)$ from the table.

$f(1)=-1$

$f(6)=6.5$

x	$f(x)$
1	-1
2	-2.5
3	-7
4	Error
5	11
6	6.5
7	5

(b) Why does the calculator give an ERROR at $x=4$?

When $x=4$ the denominator is equal to 0, therefore $f(x)$ is undefined.

(c) Are there any values except $x=4$ that are not in the domain of f? Explain.

No because the only x-value that breaks the function is $x=4$

(*) A function is broken when:

1) A fraction is undefined
2) A negative under a square root (imaginary)

Exercise #6: Which of the following values of x would not be in the domain of the function $y=\sqrt{x+4}$? Explain your answer.

(1) $x=0$
(3) $x=-3$
(2) $x=5$
(4) $x=-8$

$y=\sqrt{-8+4}$

$y=\sqrt{-4}$

$y=2i$ ← imaginary

$\mathbb{R}$

To find domain:

1) When we have a fraction, do not include values that make it undefined.

Ex: $f(x)=\frac{2x}{x+3}$

$x+3\neq 0$
$-3 \quad -3$
$x\neq -3$

Domain:
$x\neq -3$

2) When we have a square root, do not include values that make under the squareroot negative.

Ex: $f(x)=\sqrt{x-4}$

$x-4\geq 0$
$+4 \quad +4$
$x\geq 4$

Domain:
$x\geq 4$

3) When we have a square root as a denominator, We want values under the square root that are positive only.

Ex: $f(x)=\frac{2x+5}{\sqrt{x+3}}$

$x+3>0$
$-3 \quad -3$
$x>-3$

Domain:
$x>-3$